In the “private integrated security” strategic segment, firms sell integrated systems of defense dual-use products and services for private sector use. An integrated solution might include a protective suit with a service that monitors its performance and the condition of the user. It might then make automatic adjustments, schedule replacements, or sound a warning under different circumstances.

Opportunities in this segment for Croatian firms may lie in comprehensive safety solutions that incorporate a mix of elements. The mix could include transport, communications, and products such as personal protective equipment. Authorities can harness such integration to respond to large-scale disasters.
Industry Snapshot

Defense dual-use items are goods with both civilian and military uses. Per World Bank policy, this report focuses only on the civilian applications of dual-use technology. Even so, defense dual-use is a broad area spanning several often tangentially related sectors.

The core competency of defense dual-use companies in Croatia relates to the supply of stand-alone: personal protective equipment, communications equipment, and vehicles.

The dual-use industry makes up 3.9% of total EU exports, or EUR 180 billion. Nuclear machinery, plastics, electrical machinery, aircraft, and spacecraft are the most critical industries from the perspective of exports of dual-use goods.

Croatian capacities in defense dual-use sectors lie mainly in manufacturing standalone products connected to required defense capabilities. Civil security is also relevant, albeit to a lesser extent.
Emerging Strategic Segments

Products in emerging dual-use strategic segments exhibit sophisticated technological integration. While most Croatian industry only produces standalone products, in emerging segments firms must integrate advanced technology and communications systems with these products. In this way, traditional product-based segments can be differentiated from segments where firms offer integrated solutions.

One example of the latter is industrial personal protective equipment with wearable sensor technology, complemented by a service that monitors performance and alerts the purchaser when the equipment needs to be replaced. Timely replacement protects the health and safety of workers. Another example is mass rescue operations (such as during wildfires or forest fires) that require lots of ground personnel, road vehicles, boats, and helicopters of diverse kinds from various agencies. Personnel, vehicles, boats, and helicopters may have different communications systems and protocols, depending on their modality and the agencies that manage them. In such cases, it is crucial to coordinate departures, routes and rescue operations to maximize performance and avoid unnecessary delay. Quickly combining these fragmented, disparate systems into a single cooperative communications network can save lives. In the case of Croatia’s 2017 wildfires, the existence of an automated coordination system for emergency personnel would have significantly improved the response.

There are two main markets for integrated defense dual-use solutions: government and private. Major private sector buyers include companies that engage in oil & gas and mining activities that involve high physical risk. Government buyers can be national, county, or municipal authorities, including public-sector entities such as hospitals or fire departments.

The main difference between government and private buyers is the purchasing method. Government buyers usually use competitive public tenders. The tenders are subject to complex institutional rules and external legal regulations. They take place infrequently, and the contract amounts are substantial. Together, these factors can increase pressure on firms and put them in a less favorable bargaining position. Unlike government buyers, private buyers make their decisions based on market factors.

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“Private Integrated Solutions”

For Companies with Large Networks of Valuable, High-profile Assets

The emerging “private integrated solutions” strategic segment is especially attractive for Croatia. Selling to private buyers may be more attractive than selling to government buyers.

There is a clear market of buyers for the “private integrated solutions” strategic segment. Buyers include companies with large networks of valuable, high-profile assets. These firms have an interest in monitoring, surveillance, and security services aimed at protecting their assets from outside threats.
Where Is the Value Chain Weak?

Croatian companies’ ability to thrive in the emerging “private integrated solutions” strategic segment depends on their ability to evolve their offerings to meet buyers’ demands. These specific opportunities in the value chain in Croatia require strengthening:

- **Communications.** High-power wireless networking or low latency wireless communications technology that can handle high volumes of data and can operate under poor, dangerous conditions (especially during emergency situations) is a needed area of innovation in Croatia.

- **Interoperability.** A critical area for research and development would be integrating personal protective equipment into the rest of a solutions platform.

- **Textiles.** Textiles are the traditional base for personal protective equipment (PPE). However, to keep pace with industry movements, Croatia will need to develop its PPE products using advanced materials and wearables.

- **Autonomous vehicles.** Autonomous vehicles of all kinds (including autonomous aerial vehicles, autonomous ground vehicles, and autonomous underwater vehicles) would be useful in crisis management and search & rescue functions. A challenge is to find the right business models to motivate private research into exploring different applications of these technologies to such use cases.

High-power wireless networking or low latency wireless communications technology that can handle high volumes of data and can operate under poor, dangerous conditions and emergency situations is an area of need of innovation in Croatia.
Areas for Reform

Certain aspects of the industry ecosystem limit Croatia’s competitiveness in the emerging “private integrated solutions” strategic segment.

Factor Conditions

Finding qualified workers is challenging. The number of science, math, computing and engineering graduates in Croatia is not high. In 2013, 5,300 students completed a degree in an engineering field, and only 2,900 in sciences, math, and computing. Also, labor in the defense dual-use sector is in short supply. Due to open labor markets in the EU, good engineers can move abroad for much higher net wages.

A common platform for collaboration and cooperation could help ensure that domestic firms benefit from any investment in this sector.

From 2000 to 2014, productivity increased by only 20 percent while real wages increased by over 70 percent. The fact that wages are rising faster than productivity gives cause for concern over the long-term cost-competitiveness of the Croatian workforce.

Finance is hard to access. Typical short-term loans are charged interest rates of 4.7 percent in Croatia. The Croatian Bank for Reconstruction and Development (HBOR) does offer concessional loans with interest rates of 2 percent to small- and medium-sized enterprises (SMEs) investing in priority regions of the country, and of 4 percent to other SMEs.

Croatia’s business infrastructure needs improvement. Croatia ranks 40th of 140 countries in quality of infrastructure. To compete in the “private integrated solutions” strategic segment, companies need to invest in production and manufacturing capacities, R&D facilities, testing laboratories (e.g., new materials testing), IT infrastructure and communication centers, and certification laboratories.

Strategy, Structure, and Rivalry

Value chain linkages within Croatia are shallow. Successful, export-oriented firms in the defense dual-use sector source their inputs from outside the country.

Many firms rely on sales to the public sector. They depend on competitive bidding processes. At the same time, they find the competitive bidding processes in other European countries difficult to penetrate.

Cooperation between firms is almost non-existent. The Croatian defense dual-use sector consists of disparate firms engaged in different activities. Many are trying to do business and compete in isolation. A common platform for collaboration and cooperation could help ensure that domestic firms benefit from any investment in this sector. Additionally, to build the volumes necessary for export, Croatian companies may need to band together and jointly market to targeted geographies.

Related and Supporting Industries

There is limited cooperation between the private sector and academia. Croatia’s Defense Industry Competitiveness Cluster, formed in 2013, exists to connect large producers of defense dual-use equipment with academia. It consists of 32 private sector entities, two regional authorities, six support institutions and nine scientific and research institutions. However, there is a continuing need to improve collaboration between business entities and the scientific community to boost the climate of innovation.

Scientific research in Croatia does not follow the needs of the business sector. Researchers and other stakeholders need to collaborate more. Firms cannot access research infrastructure. Research rarely translates into practice. Research goals and private sector priorities are not aligned.
Recommendations

Croatia could improve its position in the emerging “regulated civilian solutions” strategic segment by:

1. **Holding a competition to design products, services, or solutions for search and rescue applications.** This competition would encourage innovation that would help solidify Croatia’s position in several relevant areas. It would also promote collaboration across different industries. The Ministry of Economy Entrepreneurship and Crafts (MoEEC) could implement this recommendation as prize financing.
   
   *Estimated timeframe: 2 years.*

2. **Jumpstarting advanced demand.** To jumpstart advanced demand for search and rescue solutions in Croatia, a public agency could issue a tender for Croatian companies to develop integrated technologies and response capacities for emergencies. Payment would be issued based on the ability of the company to respond to emergencies—according to pre-agreed performance indicators—in real life and test scenarios. Implementation of this recommendation would be supported by a comprehensive financial support scheme for public procurement of innovative goods and services (as a technical assistance program for line ministries).
   
   *Estimated timeframe: 7–10 years.*

3. **Conducting technology scouting.** Scouting would help firms in the “private integrated solutions” segment find the best technology providers globally. MoEEC could implement this recommendation (through a technical assistance program) as a matching grants scheme.
   
   *Estimated timeframe: 3 years.*

4. **Providing training on innovations in the “private integrated solutions” strategic segment, such as autonomous agents for search and rescue.** MoEEC could contract this program to relevant government agencies as a technical assistance program.
   
   *Estimated timeframe: Includes short- (1 year) and long-term (10 year) programs.*

5. **Developing certification capacity.** Certification is relevant in several areas related to the defense dual-use sector. For example, the EU requires manufacturers to affix Conformité Européene (CE) marking to certain types of personal protective equipment. MoEEC could implement this recommendation as a matching grants program.
   
   *Estimated timeframe: 6 years.*

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